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Cognitive Structure Visualization in Legal Statements

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Introduction



Legal statements are lengthy and contain large amounts of complex information. Consequently, it is often difficult for readers to identify connections between disparate pieces of evidence and to properly and objectively assess their value to the case in question.

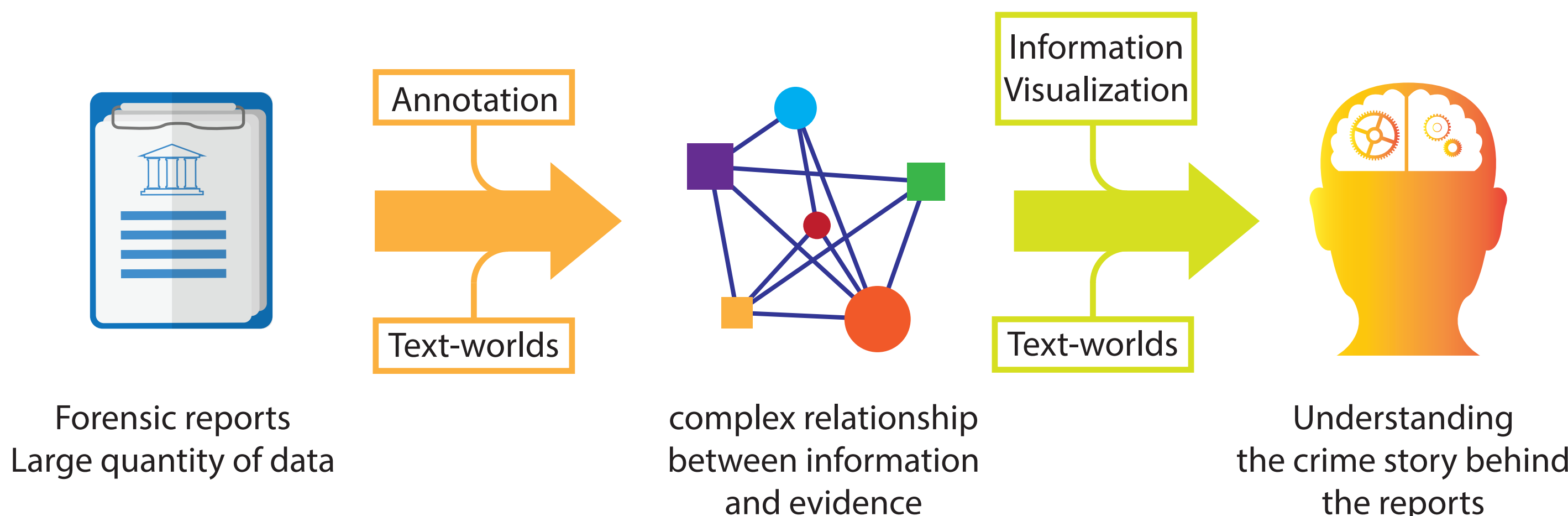
This research investigates the opportunities in the convergence of linguistic approaches to extracting and reconstructing the cognitive structure, i.e. "Text-Worlds", in a statement, and the computerized operational settings for enabling effective and hopefully more accurate interpretation of forensic discourse through visualization.

Challenges

- Legal practitioners usually have to face necessarily detailed, extremely complicated and large amounts of text records.
- It is often challenging for them to identify connections between disparate pieces of linguistic evidence, and to properly assess their probative values to the case in question.



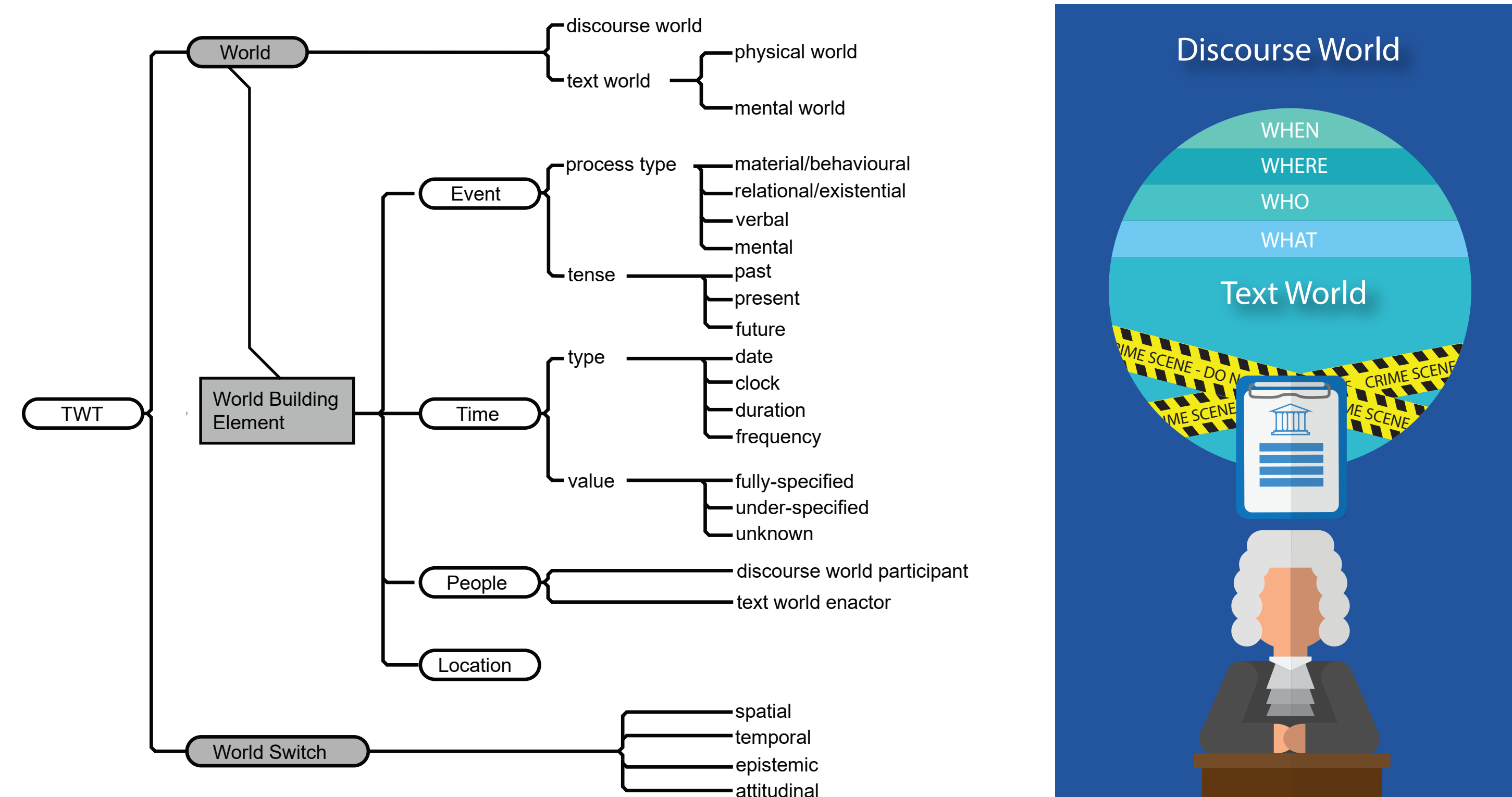
Research Rationale



This project uses a model of human discourse processing (Text World Theory) to improve computer-based techniques for visualizing complex language data pertaining to forensic investigations.

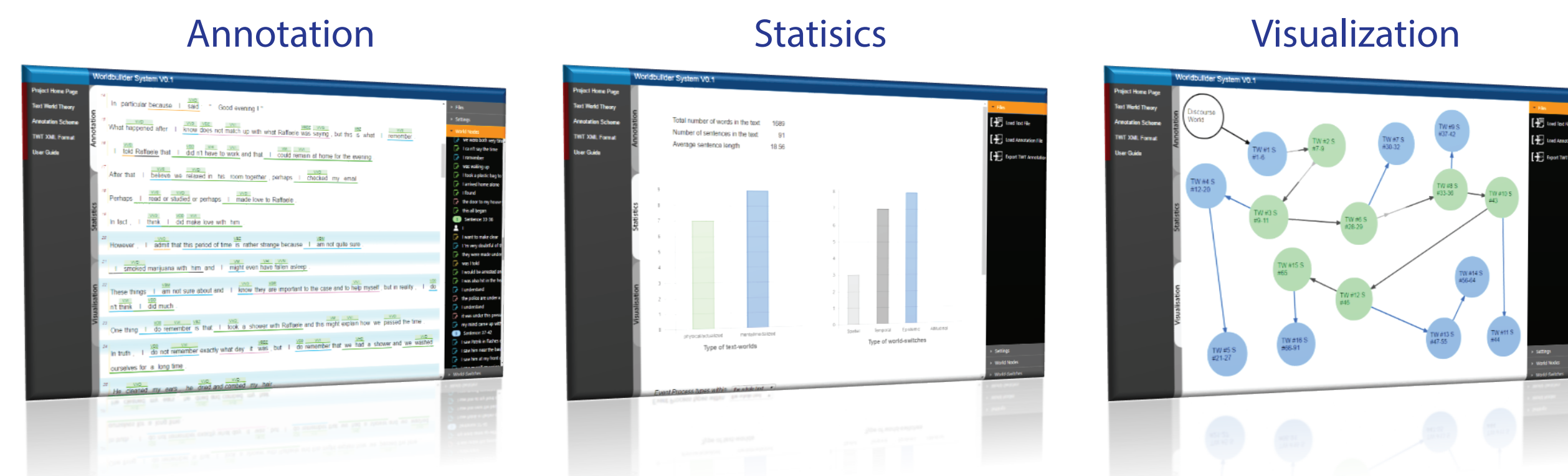
What is Text World Theory

As a cognitive linguistic model of discourse processing, Text World Theory (TWT) aims to account for how participants manage the production and reception of language during the communication process. In our research, TWT has been operationalized as a structured framework based on the nature of the legal statements.



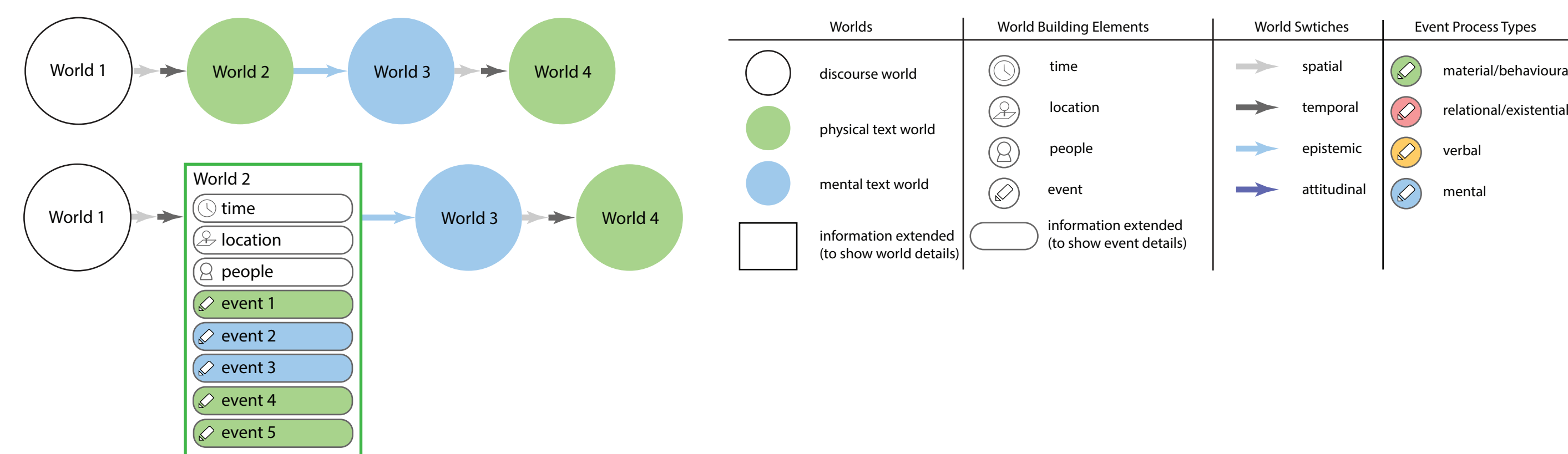
Worldbuilder

Based on the TWT cognitive framework, Worldbuilder has then been developed with two primary objectives: (a) to assist human researchers with complex language data annotation, and (b) to improve computer-based techniques for quantifying and visualizing annotated information for further linguistic and evidential analysis.



Visualizing TW cognitive diagrams

The TWT cognitive framework is employed for analyzing legal statements via reconstructing the text-worlds projected in a text. The world building elements, together with world-switches, offer the building blocks for answering the questions such as WHO, WHEN, WHERE and WHAT HAPPENED around a case.

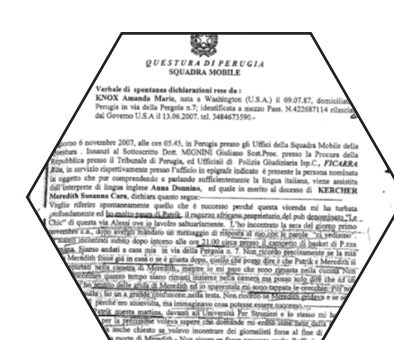


Illustrative Example - Meredith Kercher Murder Case



Meredith Kercher (1985 - 2007)

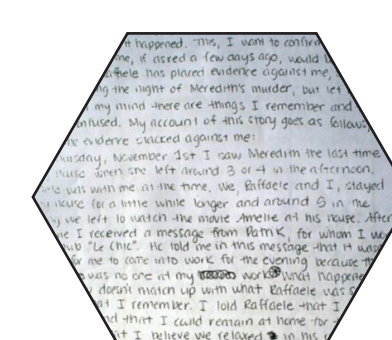
Meredith Kercher, a British student, was murdered on the night of November 1, 2007 in the apartment she shared with three other young women, in Perugia, Italy. Three people were charged with the murder. One of them was Amanda Marie Knox. In this example, we studied three controversial statements made by Knox, and visualized them in the Worldbuilder system.



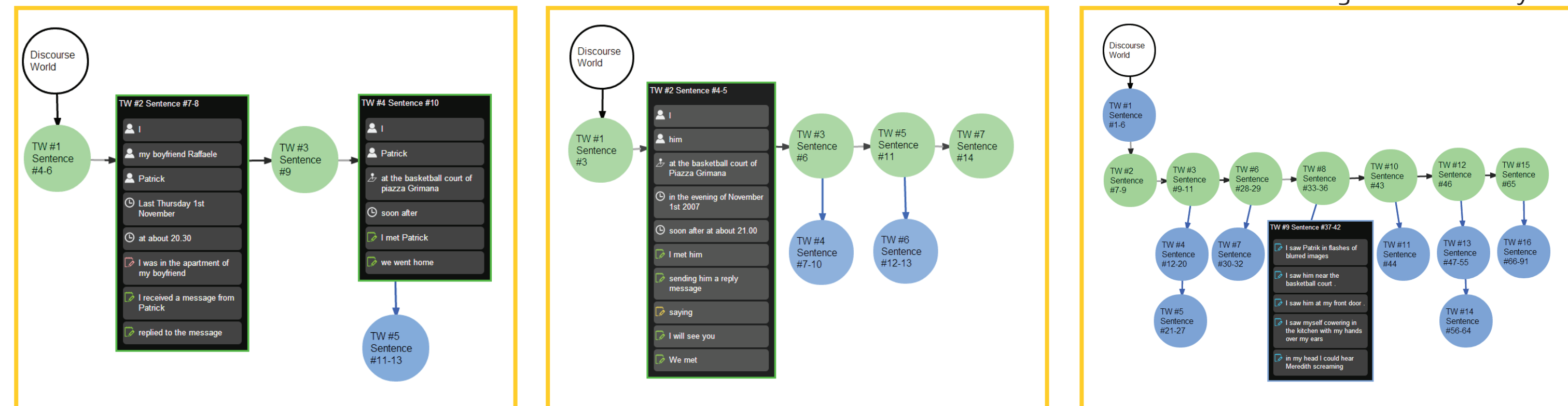
Statement 1: made at 1:45 am



Statement 2: made at 5:45 am



Statement 3: handwritten, made in the evening on the same day



When comparing those results, the first 2 statements show more prominent projection of actual happenings or intentional actions. By contrast, in the statement 3, we see more prominent text-worlds projecting the happenings within her mind. Her previous affirmative statements with regard to the key events (i.e. her meeting Patrick, being in the crime scene, hearing Meredith screaming) all become embedded in her mental world in S3: "in my mind", "in my head", "seem unreal to me", "like a dream";

Conclusion and Future Works

In this research, an information visualization scheme for annotating and representing complicated legal statements has been outlined. A prototype of visualization system - Worldbuilder - has been developed with the theoretical underpinnings of Text World Theory.

Currently, the cognitive structure of a statement is visualised as an interactive diagram. We will further enable functions like filtering and integration for assisting cross referencing, interpretation and validation demands.